ABSTRACT OF THE DISCLOSURE

A silicon-based film is provided which comprises a crystal phase formed on a substrate with a surface shape represented by a function f, wherein the silicon-based film is formed on a substrate with a surface shape having a standard deviation of an inclination arctan (df/dx) from 15° to 55° within the range of a sampling length dx from 20 nm to 100 nm, a Raman scattering strength resulting from an amorphous component in the silicon-based film is not more than a Raman scattering strength resulting from a crystalline component, and a difference between a spacing in a direction parallel to a principal surface of the substrate and a spacing of single crystal silicon is within the range of 0.2% to 1.0% with regard to the spacing of the single crystal silicon.